General

Guideline Title

Guidelines for the prevention, detection and management of chronic heart failure in Australia.

Bibliographic Source(s)

National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand, Chronic Heart Failure Guidelines Expert Writing Panel. Guidelines for the prevention, detection and management of chronic heart failure in Australia. Sydney (Australia): National Heart Foundation of Australia; 2011 Oct. 83 p. [376 references]

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand, Chronic Heart Failure Guidelines Expert Writing Panel. Guidelines for the prevention, detection and management of chronic heart failure in Australia, 2006. Sydney (Australia): National Heart Foundation of Australia; 2006 Nov. 79 p.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- April 8, 2016 – Metformin-containing Drugs : The U.S. Food and Drug Administration (FDA) is requiring labeling changes regarding the recommendations for metformin-containing medicines for diabetes to expand metformin's use in certain patients with reduced kidney function. The current labeling strongly recommends against use of metformin in some patients whose kidneys do not work normally. FDA concluded, from the review of studies published in the medical literature, that metformin can be used safely in patients with mild impairment in kidney function and in some patients with moderate impairment in kidney function.
- March 22, 2016 – Opioid pain medicines : The U.S. Food and Drug Administration (FDA) is warning about several safety issues with the entire class of opioid pain medicines. These safety risks are potentially harmful interactions with numerous other medications, problems with the adrenal glands, and decreased sex hormone levels. They are requiring changes to the labels of all opioid drugs to warn about these risks.

Recommendations

Major Recommendations

Note from the National Guideline Clearinghouse: Throughout the original guideline document, boxed "practice points" highlight key issues, while summaries of graded recommendations are provided for most sections.

The grades of recommendations (A-D) are defined at the end of the "Major Recommendations" field.

Diagnosis

Symptoms of Chronic Heart Failure (CHF)

Practice Point

Clinical diagnosis of CHF is often unreliable, especially in obese patients, those with pulmonary disease and the elderly. Therefore, it is important to perform investigations to confirm the diagnosis.

Diagnostic Investigations

Practice Point

The classic symptom of CHF is exertional dyspnoea or fatigue. Orthopnoea, paroxysmal nocturnal dyspnoea (PND) and ankle oedema may appear at a later stage. Physical signs are often normal in the early stages. Examination should include assessment of vital signs, cardiac auscultation (murmurs, S3 gallop) and checking for signs of fluid retention (e.g., raised jugular venous pressure, peripheral oedema, basal inspiratory crepitations).

All patients with suspected CHF should undergo an electrocardiogram (ECG), chest x-ray, and echocardiogram, even if the physical signs are normal. Full blood count, plasma urea, creatinine, and electrolytes should be measured during the initial workup, and if there are any changes in the patient's clinical status. Urea, creatinine, and electrolytes should also be checked regularly in stable patients, and when changes are made to medical therapy.

The role of plasma B-type natriuretic peptide (BNP) measurements is evolving, but it has been shown to improve diagnostic accuracy in patients presenting with unexplained dyspnoea. In patients with new symptoms, where the diagnosis is not clear following the initial clinical assessment and an echocardiogram cannot be organised in a timely fashion, then measurement of BNP or N-terminal proBNP may be helpful. In this setting, a normal level makes the diagnosis of heart failure unlikely (especially if the patient is not taking cardioactive medicine). If the level is raised, further investigation—including echocardiography—is warranted.

Underlying aggravating or precipitating factors (e.g., arrhythmias, ischaemia, non-adherence to diet or medicines, infections, anaemia, thyroid disease, addition of exacerbating medicines) should be considered and managed appropriately.

Recommendations for Diagnostic Investigation of CHF

- All patients with suspected CHF should undergo an echocardiogram to improve diagnostic accuracy and determine the mechanism of heart failure. (Grade of recommendation = C)
- Coronary angiography should be considered in patients with a history of exertional angina or suspected ischaemic left ventricular (LV) dysfunction. (Grade of recommendation = D)
- Plasma BNP or N-terminal pro-BNP measurement may be helpful in patients presenting with recent-onset dyspnoea; it has been shown to improve diagnostic accuracy with a high negative predictive value (Januzzi et al., 2005; Doust et al., 2004; Mueller et al., 2004; Maisel et al., 2003). (Grade of recommendation = B)
- Repeated measurement of plasma BNP or N-terminal pro-BNP to monitor and adjust therapy in CHF should be confined to patients with CHF and systolic dysfunction who are not doing well on conventional management. Further, more definitive trials are required to fully establish the role of hormone level measurement in guiding CHF treatment (Troughton et al., 2000; Jourdain et al., 2007; Pfisterer et al., 2009; Lainchbury et al., 2009; Felker et al., 2009; Porapakkham et al., 2010). (Grade of recommendation = B)
- Haemodynamic testing should not be used routinely, but on a case-by-case basis. It may be particularly helpful in patients with refractory CHF, recurrent heart failure with preserved systolic function (HFPSF) (diastolic CHF), or in whom the diagnosis of CHF is in doubt (Stevenson, Tillisch, & Hamilton, 1990). (Grade of recommendation = B)
- Endomyocardial biopsy may be indicated in patients with cardiomyopathy with recent onset of symptoms, where coronary heart disease (CHD) has been excluded by angiography, or where an inflammatory or infiltrative process is suspected (McCarthy et al., 2000). (Grade of recommendation = D)
- Nuclear cardiology, stress echocardiography, and positron emission tomography (PET) can be used to assess reversibility of ischaemia and

viability of myocardium in patients with CHF who have myocardial dysfunction and CHD. Protocols have been developed using magnetic resonance imaging (MRI) to assess ischaemia and myocardial viability, and to diagnose infiltrative disorders. However, MRI is not widely available. (Grade of recommendation = D)

- Thyroid function tests should be considered, especially in older patients without pre-existing CHD who develop atrial fibrillation, or in whom no other cause of CHF is evident. (Grade of recommendation = D)

Supporting Patients

Recommendations for Discussion with Patients with CHF

- Lifestyle: Adopt a healthier lifestyle to address risk factors/conditions contributing to the development and progression of CHF (see Section 6, Non-Pharmacological Management, in the original guideline document).
- Personal issues: Understand the effect of CHF on personal energy levels, mood, depression, sleep disturbance, and sexual function, and develop strategies to cope with changes and emotions related to family, work, and social roles.
- Medical issues: Consider practical issues related to pregnancy, contraception, genetic predisposition and practical items, such as an alert bracelet and a diary for daily weights/medications.
- Support: Access to support services, such as Heart Support Australia, Cardiomyopathy Association of Australia, home help, and financial assistance; access to consumer resources.

Practice Point

Information for people with CHF can be obtained through the Heart Foundation's telephone information service, Heartline 1300 36 27 87 (local call cost) and the Heart Foundation website: www.heartfoundation.com.au. Patients should also consult their local phone directories for contact details for Heart Support Australia and the Cardiomyopathy Association of Australia in their state or territory.

Non-Pharmacological Management

Physical Activity and Rehabilitation

Practice Point

Non-pharmacological management may be as important as prescribing appropriate medicines. Patients with CHF may develop physical deconditioning. Therefore, regular physical activity is recommended using a program tailored to suit the individual.

There is strong evidence supporting the benefits of regular physical activity in people with CHF (Flynn et al., 2009). All patients should be referred to a specifically designed physical activity program, if available (Grade A recommendation). The evidence is strongest for middle-aged patients with systolic heart failure. Uncertainty remains about the benefit in elderly patients and patients with CHF associated with preserved LV systolic function.

Other measures are listed in the recommendations below.

Sleep Apnoea

Practice Point

If sleep apnoea is suspected, referral to a sleep physician is indicated.

Recommendations for Non-Pharmacological Management of CHF*

- Regular physical activity is recommended (Mancini et al., 1992). All patients should be referred to a specially designed physical activity program, if available (Chati et al., 1996; Meyer et al., 1997; Sinoway, 1998). (Grade of recommendation = B)
- Patient support by a doctor and pre-discharge review and/or home visit by a nurse is recommended to prevent clinical deterioration (Rich et al., 1995; Stewart et al., 1999). (Grade of recommendation = A)
- Patients frequently have coexisting sleep apnoea and, if suspected, patients should be referred to a sleep clinician as they may benefit from nasal continuous positive airway pressure (CPAP) (Naughton, 1998). (Grade of recommendation = D)
- Patients who have an acute exacerbation, or are clinically unstable, should undergo a period of bed rest until their condition improves (McDonald, Burch, & Walsh, 1972). (Grade of recommendation = D)
- Dietary sodium should be limited to below 2 g/day (Stewart et al., 1999). (Grade of recommendation = C)
- Fluid intake should generally be limited to 1.5 L/day with mild to moderate symptoms, and 1 L/day in severe cases, especially if there is coexistent hyponatraemia (Fonarow et al., 1997). (Grade of recommendation = C)

- Alcohol intake should preferably be nil, but should not exceed 10 to 20 g a day (one to two standard drinks) (Fonarow et al., 1997). (Grade of recommendation = D)
- Smoking should be strongly discouraged. (Grade of recommendation = D)
- Patients should be advised to weigh themselves daily and to consult their doctor if weight increases by more than 2 kg in a two-day period, or if they experience dyspnoea, oedema, or abdominal bloating. (Grade of recommendation = D)
- Patients should be vaccinated against influenza and pneumococcal disease. (Grade of recommendation = B)
- High-altitude destinations should be avoided. Travel to very humid or hot climates should be undertaken with caution, and fluid status should be carefully monitored. (Grade of recommendation = C)
- Sildenafil and other phosphodiesterase V inhibitors are generally safe in patients with heart failure. However, these medications are contraindicated in patients receiving nitrate therapy, or those who have hypotension, arrhythmias, or angina pectoris (Zusman et al., 1999). (Grade of recommendation = C)
- Obese patients should be advised to lose weight. (Grade of recommendation = D)
- A diet with reduced saturated fat intake and a high fibre intake is encouraged in patients with CHF. (Grade of recommendation = D)
- No more than two cups of caffeinated beverages per day recommended. (Grade of recommendation = D)
- Pregnancy should be avoided in patients with moderate to severe CHF. (Grade of recommendation = D)
- Pregnancy in patients with mild CHF is reasonable. (Grade of recommendation = D)

* These grades of recommendation apply only to patients with CHF.

Pharmacological Therapy

Recommendations for Preventing CHF and Treating Asymptomatic LV Dysfunction

- All patients with asymptomatic systolic LV dysfunction should be treated with an angiotensin-converting enzyme inhibitor (ACEI) indefinitely, unless intolerant (Pfeffer et al., 1992; "Effect of enalapril on mortality," 1992). (Grade of recommendation = A)
- Anti-hypertensive therapy should be used to prevent subsequent CHF in patients with elevated blood pressure (Kostis et al., 1997; Dahlof, Lindholm, & Hansson, 1991; MRC Working Party and Medical Research Council, 1992; Hansson, Lindholm, & Niskanen, 1999; Hansson, Hedner, & Lund-Johansen, 2000; Brown, Palmer, & Castaigne, 2000). (Grade of recommendation = A)
- Preventive treatment with an ACEI may be considered in individual patients at high risk of ventricular dysfunction (Yusuf et al., 2000). (Grade of recommendation = B)
- Beta-blockers should be commenced early after a myocardial infarction (MI), whether or not the patient has systolic ventricular dysfunction (Dahlof, Lindholm, & Hansson, 1991; "Medical Research Council trial," 1992). (Grade of recommendation = B)
- Statin therapy should be used as part of a risk management strategy to prevent ischaemic events and subsequent CHF in patients who fulfill criteria for lipid-lowering (Kjekshus et al., 1997). (Grade of recommendation = B)

Treatment of Symptomatic Systolic CHF

Practice Point

All patients with systolic LV CHF, whether symptomatic or asymptomatic, should be commenced on ACEIs with every effort made to up-titrate to the dose shown to be of benefit in major trials.

Other recommended medicines are listed in the recommendations below.

Practice Point

Drugs to avoid in CHF:

- Anti-arrhythmic agents (apart from beta-blockers and amiodarone)
- Non-dihydropyridine calcium-channel blockers (verapamil, diltiazem)
- Tricyclic antidepressants
- Non-steroidal anti-inflammatory drugs and cyclo-oxygenase-2 enzyme (COX-2) inhibitors
- Clozapine
- Thiazolidinediones (pioglitazone, rosiglitazone)
- Corticosteroids (glucocorticoids and mineralocorticoids)
- Tumour necrosis factor antagonist biologicals
- Dronedarone has been associated with increased mortality in patients with New York Health Association (NYHA) Class IV CHF or NYHA Class II-III CHF (see Table 4.1 in the original guideline document for NYHA class definitions) with a recent decompensation

requiring hospitalisation (Kober et al., 2008), and is contraindicated in such patients.

- Trastuzumab has been associated with the development of reduced left ventricular ejection fraction (LVEF) and heart failure (Chien & Rugo, 2010). It is contraindicated in patients with symptomatic heart failure or reduced LVEF (<45%). Baseline and periodic evaluation of cardiac status including assessment of LVEF should occur.
- Tyrosine kinase inhibitors such as sunitinib have been associated with hypertension, reduced LVEF and heart failure (Garcia-Alvarez et al., 2010). The risk–benefit profile needs to be considered with these agents in patients with a history of symptomatic heart failure or cardiac disease. Baseline and periodic evaluation of LVEF should be considered, especially in the presence of cardiac risk factors.
- Moxonidine has been associated with increased mortality in patients with heart failure and is contraindicated in such patients (Cohn et al., 2003).
- Metformin appears to be safe to use in recent analysis of patients with heart failure, except in cases of concomitant renal impairment (Evans et al., 2010).

Recommendations for Pharmacological Treatment of Symptomatic CHF

First-line Agents

- ACEIs, unless not tolerated or contraindicated, are recommended for all patients with systolic heart failure (LVEF <40%), whether symptoms are mild, moderate, or severe (SOLVD Investigators, 1991; CONSENSUS Trial Study Group, 1987). (Grade of recommendation = A)
- Every effort should be made to increase doses of ACEIs to those shown to be of benefit in major trials ("Clinical outcome with enalapril," 1998; Packer, Poole-Wilson, & Armstrong, 1999). If this is not possible, a lower dose of ACEI is preferable to none at all. (Grade of recommendation = B)
- Diuretics should be used, if necessary, to achieve euvolaemia in fluid-overloaded patients. In patients with systolic LV dysfunction, diuretics should never be used as monotherapy, but should always be combined with an ACEI to maintain euvolaemia. (Grade of recommendation = D)
- Beta-blockers are recommended, unless not tolerated or contraindicated, for all patients with systolic CHF who remain mildly to moderately symptomatic despite appropriate doses of an ACEI (Packer, Bristow, & Cohn, 1996; "Effect of metoprolol CR/XL," 1999; "The Cardiac Insufficiency Bisoprolol Study," 1999; Packer, Coates, & Fowler, 2001; Flather et al., 2005). (Grade of recommendation = A)
- Beta-blockers are also indicated for patients with symptoms of advanced CHF (Packer, Coates, & Fowler, 2001). (Grade of recommendation = B)
- Aldosterone receptor blockade with spironolactone is recommended for patients who remain severely symptomatic, despite appropriate doses of ACEIs and diuretics (Pitt, Zannad, & Remme, 1999). (Grade of recommendation = B)
- Aldosterone blockade with eplerenone should be considered in systolic heart failure patients who still have mild (NYHA Class II) symptoms despite receiving standard therapies (ACEI, beta-blocker) (Zannad et al., 2011). (Grade of recommendation = B)
- Angiotensin II receptor antagonists may be used as an alternative in patients who do not tolerate ACEIs due to kinin-mediated adverse effects (e.g., cough) (Pitt, Segal, & Martinez, 1997). They should also be considered for reducing morbidity and mortality in patients with systolic CHF who remain symptomatic despite receiving ACEIs. (Grade of recommendation = A)
- Direct sinus node inhibition with ivabradine should be considered for CHF patients with impaired systolic function and a recent heart failure hospitalisation who are in sinus rhythm where their heart rate remains >70 bpm despite efforts to maximise dosage of background beta-blockade (Fox et al., 2008). (Grade of recommendation = B)

Second-line Agents

- Digoxin may be considered for symptom relief and to reduce hospitalisation in patients with advanced CHF (Digitalis Investigation Group, 1997). It remains a valuable therapy in CHF patients with atrial fibrillation. (Grade of recommendation = B)
- Hydralazine-isosorbide dinitrate combination should be reserved for patients who are truly intolerant of ACEIs and angiotensin II receptor antagonists, or for whom these agents are contraindicated and no other therapeutic option exists (Cohn, Archibald, & Ziesche, 1986). (Grade of recommendation = B).
- Fish oil (n-3 polyunsaturated fatty acids) should be considered as a second-line agent for patients with CHF who remain symptomatic despite standard therapy which should include ACEIs or angiotensin II receptor blockers (ARBs) and beta-blockers if tolerated (Gissi-HF Investigators et al., 2008). (Grade if recommendation = B)

Other Agents

- Amlodipine and felodipine can be used to treat comorbidities such as hypertension and CHD in patients with systolic CHF. They have been shown to neither increase nor decrease mortality (Packer, O'Connor, & Ghali, 1996; Cohn, Ziesche, & Smith, 1997; Packer, 2000). (Grade of recommendation = B)

- Iron deficiency should be looked for and treated in CHF patients to improve symptoms, exercise tolerance and quality of life (Anker et al., 2009). (Grade of recommendation = B)

Outpatient Treatment of Advanced Systolic CHF

Practice Point

Levosimendan is available in Australia on a compassionate-use basis. It should be reserved for patients who do not respond to dobutamine or in those in whom dobutamine is contraindicated due to arrhythmia or myocardial ischaemia.

Devices

Pacing

Practice Point

Bradycardia is common in elderly patients with advanced heart disease treated with beta-blocker therapy.

Implantable Cardioverter Defibrillators

Practice Point

Prophylactic implantable cardioverter defibrillator (ICD) implantation may be considered in patients with an LVEF ≤35%; however, this is currently constrained by funding and other logistical issues. Until these issues are resolved, this therapy may not be universally available.

Decisions about pacing, cardiac resynchronisation therapy, defibrillators, and choice of device are complex and generally require specialist review.

Recommendations for Device-Based Treatment of Symptomatic CHF

- Biventricular pacing (cardiac resynchronisation therapy, with or without ICD) should be considered in patients with CHF who fulfill each of the following criteria (Cazeau et al., 2001). (Grade of recommendation = A):
  - NYHA symptoms Class III/IV on treatment
  - Dilated heart failure with left ventricular ejection fraction ≤35%
  - QRS duration ≥120 ms
  - Sinus rhythm
- In patients in whom implantation of an ICD is planned to reduce the risk of sudden death, it is reasonable to also consider cardiac resynchronisation therapy (CRT) to reduce the risk of death and heart failure events if the LVEF is ≤30% and the QRS duration is ≥150 ms (left bundle branch block morphology), with associated mild symptoms (NYHA Class II) despite optimal medical therapy (Abraham et al., 2004). (Grade of recommendation = A)
- ICD implantation should be considered in patients with CHF who fulfill any of the following criteria (Bristow et al., 2004). (Grade of recommendation = A):
  - Survived cardiac arrest resulting from ventricular fibrillation or ventricular tachycardia not due to a transient or reversible cause
  - Spontaneous sustained ventricular tachycardia in association with structural CHD
  - LVEF ≤30% measured at least 1 month after acute MI, or 3 months after coronary artery revascularisation surgery
  - Symptomatic CHF (i.e., NYHA functional class II/III) and left ventricular ejection fraction (LVEF) ≤35%

Surgery

Coronary Revascularisation for CHD in Patients with CHF

Practice Point

Recent evidence suggests that surgical ventricular reconstruction to restore LV volume should not be recommended as a treatment for CHF.

The role of left ventricular assist devices (LVADs) continues to evolve with newer designs offering smaller devices with greater durability and fewer adverse events. LVADs may be considered in selected patients with advanced CHF as destination therapy. However, careful patient selection is warranted and the cost effectiveness remains uncertain (Grade B recommendation).

Indications for Cardiac Transplantation

Definite

- Persistent NYHA Class IV symptoms
- Volume of oxygen consumed per minute at maximal exercise (VO_2 max) <10 mL/kg/min
- Severe ischaemia not amenable to revascularisation
- Recurrent uncontrollable ventricular arrhythmias

Probable

- NYHA Class III
- VO_2 max <14 mL/kg/min + major limitation
- Recurrent unstable angina with poor LV function

Inadequate

- LVEF <20% without significant symptoms
- Past history of NYHA Class III or IV symptoms
- VO_2 max >14 mL/kg/min without other indication

Acute Exacerbations of CHF

Management of Acute Pulmonary Oedema (APO)

Practice Point

APO is a life-threatening disorder. However, appropriate therapy will often result in a marked improvement in the patient's clinical status within a few hours.

In light of available data, both CPAP and bilevel positive airway pressure (BiPAP) ventilation should be considered in the management of acute exacerbations of CHF, particularly APO (Grade A recommendation).

Emergency Management of Suspected Cardiogenic APO

A (airway)	• Exclude obstruction
B (breathing)	• Hypoxaemia (→ oxygenation) • Respiratory fatigue (→ mechanical ventilation)
C (circulation)	• Heart rate/rhythm (→ anti-arrhythmics/cardioversion) • Hypotension (→ inotropes/intra-aortic balloon pump)
D (differential diagnosis)	• Cardiogenic acute pulmonary oedema (APO) • Non-cardiogenic pulmonary oedema • Acute exacerbation of airways disease • Acute massive pulmonary embolism • Pneumothorax • Foreign body aspiration • Hyperventilation syndrome
E (aetiology) (cardiogenic APO)	• Precipitants • Ischaemia, tachyarrhythmia, fluid overload, medicine • Underlying pathology • Systolic left ventricular (LV) dysfunction—coronary heart disease, dilated cardiomyopathy, mitral regurgitation • Diastolic LV dysfunction—hypertensive heart disease, hypertrophic cardiomyopathy, aortic stenosis

	• Normal LV function—mitral stenosis

See Figure 10.1 in the original guideline document for emergency therapy of acute heart failure.

Heart Failure with Preserved Systolic Function (HFPSF)

Epidemiology/Clinical Characteristics

Practice Point

Although the epidemiology of HFPSF or diastolic heart failure has been incompletely described, the main risk factors are advanced age, hypertension, diabetes, LV hypertrophy, and CHD. Diagnosis, investigation, and treatment are summarised below.

There are still no conclusive data regarding the efficacy of any drug class in treating HFPSF.

Diagnosis, Investigation, and Treatment of HFPSF

Diagnosis

- Clinical history of CHF
- Exclude myocardial ischaemia, valvular disease
- Objective evidence of CHF (x-ray consistent with CHF)
- Ejection fraction ≥45% (echocardiography, gated blood pool scanning, left ventriculography)
- Echocardiographic or cardiac catheterization evidence of diastolic dysfunction, where possible
- Use of plasma BNP measurement for diagnosis of diastolic heart failure is not proven

Investigations

Echocardiography

- Pseudonormal or restrictive filling pattern demonstrated by mitral inflow (age appropriate)
- Left atrial enlargement
- Reduced septal annular velocity (Ea) on tissue Doppler imaging
- Ratio of E wave to Ea >15

Cardiac Catheterisation

- Elevated LV end diastolic pressure
- Prolonged Tau

Treatment (Empirical at This Stage)

- Aggressive risk factor reduction
- Hypertension—blood pressure (BP) reduction; consider ACEIs or angiotensin II receptor antagonists to reduce LV hypertrophy
- Diabetes mellitus—strict glycaemic and BP control; consider ACEIs or angiotensin II receptor antagonists early, using lower BP recommendations for treating hypertension in diabetic patients

Treatment of Associated Disorders

See Chapter 12 in the original guideline document for a discussion of treatment of associated disorders, including cardiac arrhythmia, valvular heart disease, CHD, arthritis, chronic renal failure, anaemia, cancer, diabetes, thromboembolism, and gout.

Practice Point

Rate control, rather than rhythm control, together with warfarin anticoagulation, is the preferred method of treating patients with CHF and AF if their condition permits this.

The role of AV node ablation and pulmonary vein isolation for patients with CHF and AF requires further research and no specific recommendation can be made at this stage.

Post-discharge Management Programs

Practice Point

Multidisciplinary programs of care targeting high-risk CHF patients following acute hospitalisation prolong survival, improve quality of life, and are cost effective in reducing recurrent hospital stays.

All patients hospitalised for heart failure should have post-discharge access to best-practice multidisciplinary CHF care that is linked with health services, delivered in acute and subacute healthcare settings. Priority should be given to face-to-face management of patients with CHF. The application of remote management assisted by structured telephone support and telemonitoring should be considered for those patients who do not have ready access to a CHF management program (Grade A recommendation).

Palliative Support

Practice Point

An individualised program of palliative care should be considered for patients facing the strong possibility of death within 12 months and who have advanced symptoms (i.e., NYHA Class IV) and poor quality of life, resistant to optimal pharmacological and non-pharmacological therapies.

Practice Point

Palliative care should only be considered when progressive symptoms prove to be refractory to optimal treatment.

Treating doctors should discuss with their patients the level of intervention appropriate and/or desirable during this phase of their illness, so that unwanted, traumatic interventions are prevented in the last few days of life. Both the patient and their family and carers may need significant emotional support during this process.

Definitions:

Grades of Recommendations

A. Rich body of high-quality randomised controlled trial (RCT) data
B. Limited body of RCT data or high-quality non-RCT data
C. Limited evidence
D. No evidence available – panel consensus judgment

Clinical Algorithm(s)

Clinical algorithms are provided in the original guideline document for the following:

- Diagnostic algorithm for chronic heart failure (CHF)
- Advanced diagnostic/treatment algorithm for CHF
- Pharmacological treatment of asymptomatic left ventricular (LV) dysfunction (left ventricular ejection fraction [LVEF] <40%) (New York Heart Association [NYHA] Class I)
- Pharmacologic treatment of systolic heart failure (LVEF <40%) (NYHA Class II-III)
- Pharmacologic treatment of refractory systolic heart failure (LVEF <40%) (NYHA Class IV)
- Pharmacologic treatment of heart failure after recent or remote myocardial infarction (MI)
- Management of clinical deterioration in CHF
- Management of heart failure with preserved systolic function (HFPSF) (diastolic heart failure)

Scope

Disease/Condition(s)

Chronic heart failure

Guideline Category

Diagnosis

Management

Prevention

Treatment

Clinical Specialty

Cardiology

Endocrinology

Family Practice

Internal Medicine

Preventive Medicine

Pulmonary Medicine

Surgery

Thoracic Surgery

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To obtain better health outcomes by improving the management of chronic heart failure (CHF)
- To reduce unwarranted variation from best practice treatment of CHF throughout Australia

Target Population

Patients with, or at risk of developing, chronic heart failure (CHF)

Interventions and Practices Considered

Diagnosis

1. Evaluation of signs and symptoms, including physical examination and classification according to the New York Heart Association system
2. Diagnostic testing
    - Electrocardiography (ECG)
    - Chest x-ray
    - Trans-thoracic echocardiography

- Peripheral markers (i.e., full blood count; urea, creatine, and electrolytes; thyroid function tests)
- Measurement of plasma levels of B-type natriuretic peptide (BNP)

Management

1. Non-pharmacological
    - Identification of high risk
    - Physical activity and rehabilitation
    - Bed rest
    - Nutrition, including reduced sodium and saturated fats, and weight loss
    - Fluid management, including alcohol and caffeine consumption
    - Smoking cessation
    - Self-management and patient education
    - Psychosocial support
    - Referral for sleep apnoea
    - Vaccination
    - Contraception
    - Travel restriction
2. Pharmacological
    - Angiotensin-converting enzyme inhibitors (ACEIs)
    - Beta-blockers
    - Diuretics
    - Aldosterone antagonists, including spironolactone, eplerenone
    - Digoxin
    - Angiotensin II receptor antagonists
    - Polyunsaturated fatty acids (fish oil)
    - Direct sinus node inhibitors
    - Iron
    - Other drugs, including hydralazine/isosorbide dinitrate, calcium-channel blockers (e.g., amlodipine, felodipine), alternative therapies
    - Dobutamine and levosimendan, as indicated
3. Devices, including biventricular pacing and implantable cardioverter defibrillators (ICDs)
4. Surgical approaches, including left ventricular assist devices (LVAD), and cardiac transplantation
5. Treatment of associated disorders
6. Post-discharge multidisciplinary management programs
7. Palliative care strategies

Major Outcomes Considered

- Sensitivity, specificity, and negative predictive value of diagnostic tests
- Adverse effects of treatment
- Exercise/physical activity tolerance
- Disease progression
- Morbidity and mortality
- Survival
- Quality of life
- Cost-effectiveness

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Literature searches were conducted in PubMed and Medline circa March 2008 to December 2010. Inclusion criteria applied to the update of the guideline included: only studies from 2006 onwards relevant to sections of original guideline, and which reported outcomes. Search terms included chronic heart failure and other terms including: impaired ventricular contraction, impaired relaxation.

Number of Source Documents

Not stated

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Level of Evidence

I: Evidence obtained from a systematic review of all relevant randomised controlled trials (RCTs)

II: Evidence obtained from at least one properly designed RCT

III-1: Evidence obtained from well-designed pseudo-RCTs (alternate allocation or some other method)

III-2: Evidence obtained from comparative studies with concurrent controls and allocation not randomised (cohort studies), case-control studies, or interrupted time series with a control group

III-3: Evidence obtained from comparative studies with historical control, two or more single-arm studies, or interrupted time series without a parallel control group

IV: Evidence obtained from case series, either post-test or pre-test and post-test

Methods Used to Analyze the Evidence

Review of Published Meta-Analyses

Systematic Review

Description of the Methods Used to Analyze the Evidence

The guidelines utilised criteria developed by the National Health and Medical Research Council (NHMRC) (see the "Rating Scheme for the Strength of Evidence" field).

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The guidelines provide evidence-based recommendations for the management of chronic heart failure (CHF), based on criteria developed by the National Health and Medical Research Council (NHMRC). Recommendations based on consensus expert opinion are also included where evidence-based recommendations are not available.

Rating Scheme for the Strength of the Recommendations

Grades of Recommendations

A. Rich body of high-quality randomised controlled trial (RCT) data
B. Limited body of RCT data or high-quality non-RCT data
C. Limited evidence
D. No evidence available – panel consensus judgment

Cost Analysis

The guideline developers reviewed published cost analyses.

Method of Guideline Validation

External Peer Review

Description of Method of Guideline Validation

The guideline was reviewed by individuals and organisations listed in Appendix II of guideline.

Evidence Supporting the Recommendations

References Supporting the Recommendations

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Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for selected recommendations (see the "Major Recommendations" field).

Recommendations based on consensus expert opinion are also included where evidence-based recommendations are not available.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Appropriate prevention, diagnosis and management of chronic heart failure

Potential Harms

- All forms of anaemia should be investigated. Mild thrombocytopenia may occur due to secondary chronic liver dysfunction, or as an adverse effect of drugs such as diuretics.
- Low-dose oral contraceptive usage appears to bring a small risk of causing hypertension or thrombogenicity, but these risks need to be weighed against those associated with pregnancy.
- The risk of hyperkalaemia — which is potentially lethal, particularly in the presence of angiotensin-converting enzyme inhibitors (ACEI) and/or renal impairment — requires vigilance when using spironolactone. The latter is also an androgen receptor antagonist and may cause feminisation side effects, such as gynaecomastia.
- Sustained inotropic stimulation can potentially increase myocardial oxygen demand in patients with myocardial ischaemia and possibly promote arrhythmia.
- Implantable cardioverter defibrillator (ICD) implantation may worsen quality of life, and the mortality benefit from ICD implantation needs to be balanced against the effects of living with a device that delivers painful shocks which are not controllable by the patient.
- There are early adverse events with combined cardiac resynchronisation therapy and implantable cardioverter defibrillator (CRT-ICD), including lead dislodgement and coronary sinus dissection.
- In one study of left ventricular assist devices (LVADs) there was a greater than two-fold increased risk of serious adverse events, including infection, bleeding, thromboembolism, and device malfunction.
- With oral diuretics for management of decompensated CHF, a vicious cycle may develop where deteriorating clinical status contributes to gut wall oedema, leading to reduced absorption of medicine, less effective fluid loss, and further clinical deterioration.
- In using diuretics to relieve fluid overload in decompensation, great care must be taken to avoid overzealous diuresis leading to hypovolaemia and its consequences (acute renal failure, postural dizziness), as well as hypokalaemia.
- There is some evidence that morphine may be detrimental in acute myocardial infarction (MI) and acute cardiogenic pulmonary oedema (APO), and its place in management of APO is now controversial.

- Sotalol is associated with a 1% to 3% incidence of ventricular proarrhythmia, and efficacy at one year is only 40% to 50%.
- There was no significant difference between groups within the Warfarin/Aspirin Study in Heart Failure (WASH), although there was a tendency towards an increase in hospitalisation in the aspirin group. This may be due to adverse interactions between aspirin and ACEIs, offsetting the beneficial effects of the latter.
- Spironolactone carries a significant risk of hyperkalaemia, particularly in patients who are also taking an ACEI or an angiotensin II receptor antagonist and whose creatinine clearance is less than 30 mL/min. It should be used with caution in patients with creatinine clearances between 30–60 mL/min.
- Patients with diabetes, in whom hyporeninaemic hypoaldosteronism is common, may be at risk of developing hyperkalaemia when an angiotensin II receptor antagonist is added to angiotensin-converting enzyme inhibitor therapy, and vigilant monitoring of serum potassium is recommended.
- Beta-blockers should not be initiated during a phase of acute decompensation, but only after the patient's condition has stabilised. Adverse effects of beta-blockade in this setting include symptomatic hypotension, worsening of symptoms due to withdrawal of sympathetic drive, and bradycardia. However, side effects are often transitory and do not usually necessitate cessation of the drug. Beginning at low doses with gradual increases limits these adverse effects.
- Caution is suggested with the use of digoxin in women taking hormone replacement therapy.

Contraindications

Contraindications

- Sildenafil is contraindicated in patients receiving nitrate therapy, or those who have hypotension, arrhythmias, or angina pectoris.
- Many of the medications used in treatment of chronic heart failure (CHF) are contraindicated in pregnancy.
- Non-dihydropyridine calcium-channel blockers that are direct negative inotropes, such as verapamil and diltiazem, are contraindicated in patients with systolic heart failure.
- Dronedarone has been associated with increased mortality in patients with New York Health Association (NYHA) Class IV CHF or NYHA Class II-III CHF with a recent decompensation requiring hospitalisation, and is contraindicated in such patients.
- Moxonidine has been associated with increased mortality in patients with heart failure and is contraindicated in such patients.
- Trastuzumab has been associated with the development of reduced left ventricular ejection fraction (LVEF) and heart failure. It is contraindicated in patients with symptomatic heart failure or reduced LVEF (<45%).
- Therapy with class I anti-arrhythmic agents (e.g., flecainide) is generally contraindicated in the presence of systolic heart failure.
- Arterial vasodilators, including angiotensin-converting enzyme inhibitors (ACEIs), are usually contraindicated in patients with severe aortic stenosis because of the risk of coronary hypoperfusion.
- Pre-existent impairment of left ventricular (LV) systolic function represents a relative contraindication to aggressive chemotherapy with such agents.
- Treatment of gout in the patient with chronic heart failure (CHF) is made somewhat more complex by the contraindication to the use of non-steroidal anti-inflammatory drugs and cyclo-oxygenase-2 enzyme (COX-2) inhibitors. Similarly, corticosteroids are also best avoided in the management of this complication in the CHF patient.

Relative Contraindications to Cardiac Transplantation

- Age >65
- Active infection
- Untreated malignancy, or treated malignancy in remission and <5 years follow-up
- Fixed high pulmonary pressures (pulmonary vascular resistance >4 Wood units, or mean transpulmonary gradient >12 mmHg or pulmonary artery systolic pressure >60 mmHg)
- Current substance abuse (including tobacco and alcohol)
- Coexisting systemic illness likely to limit survival
- Severe and irreversible major organ dysfunction
- Adverse psychosocial factors limiting compliance with medical therapy
- Recent pulmonary embolism (<6 weeks)
- Diabetes mellitus with severe or progressive end-organ damage
- Morbid obesity
- Unhealed peptic ulceration

Qualifying Statements

Qualifying Statements

- The guidelines are not prescriptive, as patient circumstances and clinical judgement will determine the most appropriate course of treatment for each individual with chronic heart failure (CHF). Clinical trials provide group data and clinical practice requires individual judgement.
- This material has been developed for general information and educational purposes only. It does not constitute medical advice. The health information provided has been developed by then Heart Foundation and is based on independent research and the available scientific evidence at the time of writing. The information is obtained and developed from a variety of sources including but not limited to collaborations with third parties and information provided by third parties under licence. It is not an endorsement of any organisation, product or service. While care has been taken in preparing the content of this material, the National Heart Foundation of Australia, its employees and related parties cannot accept any liability, including for any loss or damage, resulting from the reliance on the content, or for its accuracy, currency and completeness. This material may be found in third parties programs or materials (including but not limited to show bags or advertising kits). This does not imply an endorsement or recommendation by the National Heart Foundation of Australia for such third parties organisations, products or services, including their materials or information. Any use of National Heart Foundation of Australia materials or information by another person or organisation is at the user's own risk.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Clinical Algorithm

Patient Resources

Quick Reference Guides/Physician Guides

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

End of Life Care

Getting Better

Living with Illness

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand, Chronic Heart Failure Guidelines Expert Writing Panel. Guidelines for the prevention, detection and management of chronic heart failure in Australia. Sydney (Australia): National Heart Foundation of Australia; 2011 Oct. 83 p. [376 references]

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Guideline Committee

Chronic Heart Failure Guidelines Expert Writing Panel

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Financial Disclosures/Conflicts of Interest

Many members of the Writing Panel have received paid honoraria for work performed on behalf of manufacturers of therapies described in these guidelines. However, no members of the Writing Panel stand to gain financially from their involvement in these guidelines and no conflicts of interest exist for Writing Panel members, the National Heart Foundation of Australia or the Cardiac Society of Australia and New Zealand.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: National Heart Foundation of Australia, Cardiac Society of Australia and New Zealand, Chronic Heart Failure Guidelines Expert Writing Panel. Guidelines for the prevention, detection and management of chronic heart failure in Australia, 2006. Sydney (Australia): National Heart Foundation of Australia; 2006 Nov. 79 p.

Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the National Heart Foundation of Australia .

Print copies: Available from the National Heart Foundation of Australia's national telephone information service at 1300 36 27 87 or E-mail: heartline@heartfoundation.com.au.

Availability of Companion Documents

The following are available:

- Diagnosis and management of chronic heart failure. Quick reference guide for health professionals. Sydney (Australia): National Heart Foundation of Australia; 2011 Oct. 17 p. Electronic copies: Available in Portable Document Format (PDF) from the National Heart Foundation of Australia Web site .
- Multidisciplinary care for people with chronic heart failure. Principles and recommendations for best practice. Sydney (Australia): National Heart Foundation of Australia; 2010 Oct. 48 p. Electronic copies: Available in PDF from the National Heart Foundation of Australia Web site .

Print copies: Available from the National Heart Foundation of Australia's national telephone information service at 1300 36 27 87 or E-mail: heartline@heartfoundation.com.au.

Patient Resources

The following are available:

- Living well with chronic heart failure. Information sheet. 2008.
- Living every day with my heart failure. 2011.

Print copies are available from the National heart Foundation of Australia Health Information Service (phone 1300 36 27 87 in Australia).

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC Status

This NGC summary was completed by ECRI on April 12, 2007. The information was verified by the guideline developer on June 27, 2007. This summary was updated by ECRI Institute on September 7, 2007 following the revised U.S. Food and Drug Administration (FDA) advisory on Coumadin (warfarin). This summary was updated by ECRI Institute on November 6, 2007, following the updated U.S. Food and Drug Administration advisory on Viagra, Cialis, Levitra, and Revatio. This summary was updated by ECRI Institute on November 12, 2010 following the U.S. Food and Drug Administration (FDA) advisory on Afluria (influenza virus vaccine). This summary was updated by ECRI Institute on June 27, 2011 following the U.S. Food and Drug Administration advisory on Zocor (simvastatin). This NGC summary was updated by ECRI Institute on January 20, 2012. The updated information was verified by the guideline developer on February 19, 2012. This summary was updated by ECRI Institute on April 13, 2012 following the U.S. Food and Drug Administration advisories on Statin Drugs and Statins and HIV or Hepatitis C drugs. This summary was updated by ECRI Institute on April 15, 2016 following the U.S. Food and Drug Administration advisory on Metformin-containing Drugs. This summary was updated by ECRI Institute on June 2, 2016 following the U.S. Food and Drug Administration advisory on

Opioid pain medicines.

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